Sequential Combined Spinal Epidural Block Superior To Epidural Block For Total Abdominal Hysterectomy In Patient And Surgeons Perspective: Double Blind Randomized Control Trial

N Swarnkar, A Ghosh, A Yadav

Citation

N Swarnkar, A Ghosh, A Yadav. *Sequential Combined Spinal Epidural Block Superior To Epidural Block For Total Abdominal Hysterectomy In Patient And Surgeons Perspective: Double Blind Randomized Control Trial*. The Internet Journal of Anesthesiology. 2007 Volume 18 Number 2.

Abstract

Introduction: The aim of this study was to compare sequential combined spinal epidural with epidural block for total abdominal hysterectomy to assess quality of block in terms of surgeon and patient's satisfaction.
Methods: 100 patients of ASA grade I & II were randomly divided into 2 groups. Group A patients received CSE using “needle through needle technique” and were given 2.5 ml of 0.5% hyperbaric bupivacaine for spinal block. Group B patients received epidural block through catheter using 15 ml of 0.5% plain bupivacaine. In all patients, subsequent dosage of 0.5% plain bupivacaine (1.5 ml per unblocked segment) was administered to achieve a block up to T4-5. The quality of block was rated from excellent to poor by surgeon and anesthetist. Patient satisfaction was rated on 0 to 100 linear visual analog scale.
Results: The surgical analgesia and motor blockade occurred significantly early in CSE group. The quality of analgesia as assessed by anesthetist was excellent in 92% of patients in group A as compared to 30% in group B (p=0.000). In 88% cases in CSE group surgical conditions were reported as excellent by surgeons as compared to only 36% in epidural group. VAS scores for patient satisfaction were also much lower in CSE group (11.2±7.304 versus 26.4±22.94 in epidural group) (p=0.000).
Conclusion: The quality of block is superior in CSE as compared to epidural block and associated with greater degree of patient and surgeon satisfaction.

INTRODUCTION

Epidural and spinal blocks are major regional techniques with a long history of effective use for a variety of surgical procedures and pain relief. Nevertheless, both techniques have their drawbacks. Inability to control the level of block and hypotension are major disadvantages of spinal block whereas epidural block with the catheter technique gives a better control of the level of analgesia and can be used for providing post operative pain relief but major drawbacks include slower onset of action, patchy block, comparatively poor motor blockade and higher requirement of local anesthetics ([1]). The combined spinal epidural technique combines the benefits of both spinal and epidural block ([2,3,4]). It was introduced by Soresi in 1937 using “single needle – single interspace” technique ([5]). However Bonica outlined various reasons for not-so-frequent use of regional anesthesia, surgeon & patient disliking was one of them ([6]). Since surgeons are integral part of health care providing team, measuring their satisfaction with a particular anesthetic technique would enhance the quality of anesthesia practice as well as indirectly improving patient satisfaction rate. This study conducted with a purpose to evaluate the quality of block with sequential CSE and epidural technique and to assess surgeon & patient satisfaction with individual anesthetic technique.

METHODS

A prospective, randomized, double blind study was undertaken on hundred ASA physical status I and II patients of age 40-65 years. The approval of institutionals' ethical committee on research and informed consent from patients were obtained. Patients were randomly divided into two groups of 50 each. Group A patient's received CSE block using “needle through needle single interspace” technique. Group B received Epidural block through catheter. To prevent inter-patient variability, height of the patients was kept constant between 155-160 cm. Patients having

neurological or coagulation disorder, systemic hypertension, unwillingness and any anticipated difficulty in regional anesthesia were excluded from the study. Preloading was done with Ringer Lactate 10 ml/kg body weight over a period of 15 to 20 minutes. The blocks were given in lateral recumbent position in both the groups.

In group A, 18G Tuohy needle was introduced at L_{3-4} or L_{2-3} level into epidural space using loss of resistance technique with saline-air bubble filled syringe. A long 27G spinal needle was inserted through the Touhy needle with back eye opening and advanced until the tip was felt penetrating the duramater. After observing free flow of CSF & negative aspiration for blood, 2.5 ml of 0.5% hyperbaric bupivacaine (Sensorcaine® Heavy, Astrazeneca, India) was injected through spinal needle. After withdrawing the spinal needle 20G epidural catheter was inserted 3cm into epidural space and secured to skin. After waiting for 15 minutes level of block was extended to T4-5 by injecting the fractionated dose (1.5ml per unblocked segment) of 0.5% plain bupivacaine (Sensorcaine®, Astrazeneca, India) through epidural catheter. In group B epidural catheter was introduced into epidural space using the same aforementioned technique. After negative aspiration for blood & CSF a test dose consisting of 3ml 1.5% preservative-free lidoacine (Xylocard®, Astrazeneca, India) with epinephrine 1:200000 was given. Once proper placement of epidural catheter was confirmed, a total of 15 ml 0.5% bupivacaine was given through epidural catheter.

The level of sensory block was tested by an operator who was blinded to the type of block at one-minute intervals by pin-prick using a blunt tipped 25 gauge needle. After five minutes, it was tested at five-minute intervals until the start of surgery. The quality of surgical analgesia was assessed by anesthesiologist was graded as:

Excellent: no supplementary sedative or analgesic required
Good: only sedative required
Fair: both sedative & analgesic required
Poor: general anesthesia with endotracheal intubation required

The degree of motor blockade of lower limb was assessed according to modified Bromage scale as:

Grade1. Complete block (unable to move feet or knees)
Grade2. Almost complete block (able to move feet only)
Grade3. Partial block (just able to move knees)
Grade4. Detectable weakness of hip flexion while supine (full flexion of knees)
Grade5. No detectable weakness of hip flexion while supine
Grade6. Able to perform partial knee bend

The ECG & SpO_2 was monitored continuously and the blood pressure every five minutes for one hour and every 15 minutes thereafter. All the patients received supplemental O_2 through nasal cannula @ 2L/min of O_2. Hypotension (defined as 20% decrease of baseline systolic blood pressure) was treated with 3 mg ephedrine IV titrated to effect. During surgery, patients were given sedative in the form of midazolam 1-1.5 mg IV and supplementary analgesic fentanyl 1µg/kg on demand. Patients complaining of pain from surgical site were given general anesthesia with endotracheal intubation. The total dose of bupivacaine and requirements of analgesic, sedative, antiemetic and any complications were recorded.

The surgeon was asked to rate the surgical conditions on a four-grade scale from excellent to poor. Each patient was asked to rate the satisfaction with anesthesia as ‘satisfied' to ‘extremely dissatisfied' on a 0 to 100 mm linear visual analog scale. Any score more than 25 was taken as dissatisfaction with anesthetic technique. Reasons for dissatisfaction were further explored and whenever possible attended with explanation and/or treatment. Neither patient nor the surgeon was aware of the type of anesthetic block performed.

After surgery all patients were nursed in the postoperative recovery room during the first 24 hr. The ECG & SpO_2 was monitored continuously and blood pressure was noted every ten minutes during the first hour then every 30 min until discharge from recovery room.

Statistical analysis: All clinical data were presented as Mean±Standard deviation, median and number of patients. Statistical analysis was performed using StatistiXL version 1.8 for Microsoft Excel 2003. Man-Whitney U test was performed for qualitative data like quality. Student's t–test was applied for duration of analgesia and drug doses and Chi-square test for differences in frequencies. A value of $P < 0.05$ was considered significant.

RESULTS

Both groups were comparable in terms of age, weight, height, sex, ASA grading and nature of surgery.

Figure 1

Table 1: Demographic data

Variable	Group A	Group B	*P*- value
Age (yr)	43.34±12.38	42.28±12.18	NS
Weight (kg)	50.46±5.33	51.52±4.64	NS
Height (cm)	153.46±2.68	153.24±2.92	NS

Data presented as Mean ± S.D.
NS = Not significant as p>0.05

Hemodynamic changes during anesthesia and surgery were also comparable in both the groups. Maximum number of patients in both groups had fall of 10 – 20% in blood pressure and heart rate. The mean onset time for sensory block in group A (9.36±0.96 min) was significantly shorter as compared to group B (18.17±2.04 min) (p=0.000). Similarly in group B motor block onset time was significantly longer (14.08±1.72 minutes) as compared to 6.10±1.00 minutes in group A.

Figure 2

Table 2: Onset time of sensory and motor block

Variable	Group A	Group B	P value
SB	9.36±0.96	18.17±2.04	0.000, HS
MB	6.10±1.00	14.08±1.72	0.000, HS

Data presented as Mean ± Standard deviation.
SB=sensory block; MB=motor block
HS= highly significant difference as p<0.001

The level of sensory block obtained with single dose of bupivacaine was comparable in both the group (median-T7-8). The total amount of bupivacaine required to reach the sensory level of T4-5 was approximately twice in group B (77.10±12.49 mg) as compared to group A (39.50±13.55 mg) (p=0.000). Two-segment regression time after initial dose bupivacaine was twice as much in group B as compared to group A (120.75±7.56 versus 81.75±11.09 minutes).

Figure 3

Table 3: Level of sensory block, Two-segment regression time and bupivacaine consumption to achieve same sensory level

Variable	Group A	Group B	P value
Level of block	T_{7-8}	T_{7-8}	NS
TSRT (min)	81.75±11.09	120.75±7.56	0.001, HS
Amount of bupivacaine (mg)	42.6±12.6	113.5±11.78	0.000, HS

Data presented as median and mean ± Standard deviation. TSRT = two segment regression time
HS= highly significant difference as p<0.001

Degree of motor blockade using modified Bromage scale was assessed. In group A, all patients had grade 1 blockade as compared to only 18 in group B (p=0.000). The quality of analgesia as assessed by anesthetist was excellent in 92% of patients in group A as compared to 30% in group B (p=0.000), whereas six patients in group B had poor quality of analgesia. In 88% cases in CSE group surgical conditions were reported as excellent by surgeons as compared to only 36% in epidural group.

Figure 4

Table 4: Quality of anesthesia as assesses by anesthetist and surgeon

Bromage Scale	Group A	Group B	P value
Score 1	50	18	0.000, HS
Score 2	0	24	
Score 3	0	8	
Score 4	0	0	
Score 5	0	0	
Score 6	0	0	

Data presented as number of patients.
HS = highly significant difference as p<0.001

Figure 5

Table 5: Degree of muscle relaxation

Quality		Group A	Group B	P value
Excellent	A	46	15	
	S	44	18	
Good	A	1	22	
	S	3	18	
Fair	A	3	7	0.000, HS
	S	3	5	
Poor	A	0	6	
	S	0	9	

Data presented as number of patients.
HS = highly significant difference as p<0.001. A = Anesthetist, S = Surgeon

VAS scores for patient satisfaction were also much lower in CSE group (11.2±7.304 versus 26.4±22.94 in epidural group) (p=0.000).

Figure 6

Figure 1: Block assessment by anesthetist and surgeon

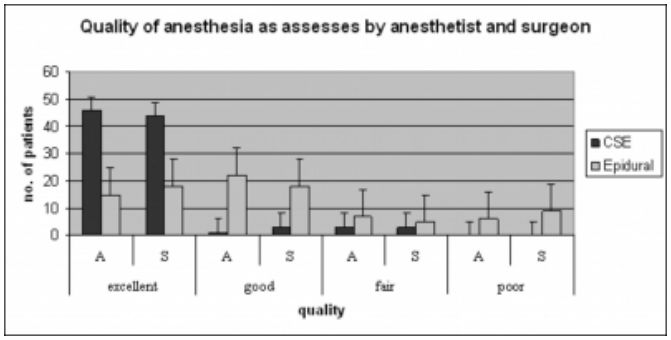
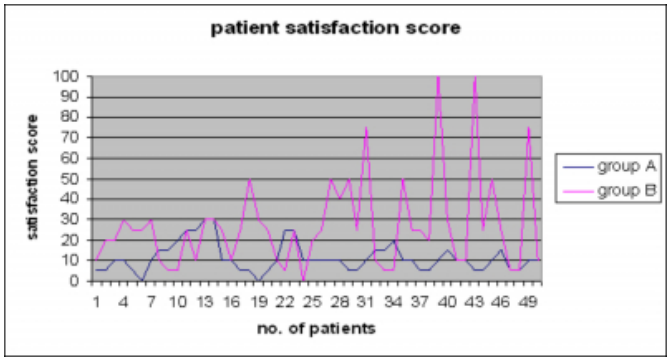


Figure 7

Figure 2: Visual analog scale (VAS) scores of patient satisfaction



Significantly larger number of patients required sedative and/or systemic analgesic during surgery in group B when compared with group A. Table 6 shows complication rates in both the groups.

Figure 8

Table 6: Complication rates in both the groups

Variable	Group B	Group B	P value
Nausea	5/50	1/50	
Vomiting	3/50	0/50	0.486
Hypotension	0/50	0/50	
PDPH	0/50	0/50	

Data presented as number of patients.
PDPH = Postdural puncture headache

None of the patients in both the groups had significant hemodynamic alteration of more than 20% of baseline following the block. Eight patients had nausea/vomiting in group A as compared to only one in group B whereas none had postdural puncture headache in both the groups.

DISCUSSION

In this study, the quality of block was superior with sequential CSE block as compared to epidural block alone. Various studies comparing CSE with epidural anesthesia have reported similar results in terms of degree of analgesia

and muscle relaxation ([2,7,8]). The spinal component of CSE block might be responsible for this observation. The need for supplementary analgesics and sedatives were significantly higher in epidural group. The higher incidence of supplementation and failure rate and poor muscle relaxation with epidural bupivacaine has been reported by other workers as well ([9,10,11]). The dose of bupivacaine required to produce T4-5 block was almost twice with epidural block as compared to CSE block. Rawal et al also observed similar findings with CSE group ([7]). Hemodynamically, the incidence of hypotension and bradycardia was almost similar in both the groups. The majority of the patients in both groups had a fall of 10 – 20% in pulse rate and blood pressure. In CSE, although spinal block is given initially, significant hemodynamic changes are not observed because of less extensive spinal block (T_{7-8}) due to sequential CSE technique combined with slower onset of epidural block allowing time for compensatory mechanism to take effect ([12]). None of patients complained of post dural puncture headache (PDPH). The use of 27G spinal needle may have contributed to the absence of headache in our study, a finding also noted by Norris et al as well. In majority of cases in CSE surgical conditions were rated excellent by surgeons (88% in CSE versus 36% in epidural group). Björn Hölmström et al have similarly reported excellent surgical conditions CSE technique in orthopaedic surgery ([2]). VAS scoring for patient satisfaction was similarly much lower in CSE group (11.2±7.304 vs. 26.4±22.94 in epidural group). Jonathan H. Waters et al conducted study to assess surgeon and patient satisfaction with upper extremity block & reported good patient satisfaction with VAS score of 1.7 ±2.3 on a 0 to 10 cm scale which is quite comparable to our finding ([14]). Similar degree of patient satisfaction with CSE technique has also been reported by other workers ([15,16]).

In conclusion, CSE is superior technique to epidural alone for abdominal surgeries like total abdominal hysterectomy in regard to quality of block and surgeon & patient satisfaction.

CORRESPONDENCE TO

Dr Nikhil Swarnkar Address: M1F3-C, Meghdoot Apartments, JNMC campus, Datta Meghe Institute of Medical Sciences, Sawangi, Wardha, Maharashtra, India. Phone: 91-7152-287701-06 ext-457 Fax: 91-7152-287714 Email: nik272001@yahoo.com

References

1. Vercauteren M. Twenty years of clinical use of combined spinal-epidural anesthesia: The evolution of equipment. In: clinical dialogues on regional anesthesia. 2000:17;1-5.
2. Hölmström B, Laugaland K, Rawal N, Hallberg S. Combined spinal block versus spinal and epidural block for orthopedic surgery. Can J Anesth 1993;40:601-6.
3. Fan SZ, Susetio L, Wang YP et al. Low dose of intrathecal hyperbaric bupivacaine combined with epidural lidocaine for caesarean section a balance block technique. Anesth Analg 1994;78:474-77.
4. Hamdani GA, Chohan U, Zubair NA. Clinical usefulness of sequential combined spinal epidural anaesthesia in high risk geriatric patients for major orthopaedic surgery. J Anesth Clin Pharmacol 2002;18(2):163-66.
5. Soresi A. Episubdural anesthesia. Anesth Analg 1937;16:306-10.
6. Bonica JJ. Regional anesthesia in private practice. Anesthesiology 1960;21:554-6.
7. Rawal N, Holmstrom B, Crowhurst JA, Van Zundert A. The Combined spinal-epidural technique. Anesthesiol Clin North America. 2000 Jun;18(2):267-95.
8. Collis RE , Davis DW, Aveling W. Randomized comparison of combined spinal epidural and standard epidural analgesia in labor. Lancet 1995;345:1413-16.
9. Scott DB, McClure JH, Giasi RM et al. Effects of concentration of local anesthetic drugs in extradural block. Br J. Anaesth 1980;52:1033-1037.
10. Cousins MJ. Epidural neural blockade. In: Cousins MJ, Bridenbaugh PO (Eds.). Neural Blockade in Clinical Anesthesia and Management of Pain. Philadelphia: JB Lippincott, 1988:310-11.
11. Nydahl PA, Axebson K, Philipson L, Leissner P, Larsson PG. Motor blockade and EMG recordings in epidural anaesthesia. A comparison between mepivacaine 2%, bupivacaine 0.5% and etidocaine 1.5%. Acta Anaesthesiol Scand 1989; 33: 597-604
12. Thoren T, Holmstrom B, Rawal N et al. Sequential combined spinal epidural block versus spinal block for cesarean section: Effects on maternal hypotension and neurobehavioral function of the newborn. Anesth Analg 1994;78:1087-1092.
13. Norris MC, Grieco WM, Borkowsi M et al. Complications of labor analgesia: epidural versus combined spinal epidural techniques. Anesth Analg 1994;79:529-37.
14. Waters JH, Leivers D, Maher D, Scanlon T, DeGuzman GM. Patient and Surgeon Satisfaction with Extremity Blockade for Surgery in Remote locations. Anesth Analg 1997;84:773-6)
15. Sia AT, Camann WR, Ocampo CE, Goy RW, Tan HM, Rajammal S. Neuraxial Block for Labour Analgesia -Is the Combined Spinal Epidural (CSE) Modality a Good Alternative to Conventional Epidural Analgesia? Singapore Med J 2003 Sep;Vol 44(9):464-470
16. Moeti NMAE, Youssef ZB, Aal SSAE, Haleem MAAE. Combined Spinal Epidural versus Epidural Sufentanil and Bupivacaine in Labour Clinical and Histological comparative Study. The Egyptian Journal of Hospital Medicine 2006 Dec;Vol 25: 672 - 690

Author Information

Nikhil Swarnkar, MD Anesthesiology
Assistant Professor, Department of Anesthesiology and Intensive care, Datta Meghe Institute of Medical Sciences

Alok Ghosh, MD Anesthesiology
Professor and Head, Department of Anesthesiology and Intensive care, Datta Meghe Institute of Medical Sciences

Anshul Yadav
Resident anesthesiologist, Department of Anesthesiology and Intensive care, Datta Meghe Institute of Medical Sciences